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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,024

07/14/2006

Matthew T. Pretz

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1125

109 7590 11/09/2009

The Dow Chemical Company  
Intellectual Property Section  
P.O. Box 1967  
Midland, MI 48641-1967

EXAMINER

NGUYEN, TAM M

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

11/09/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/586,024	PRETZ ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	TAM M. NGUYEN	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10/22/09.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,10,13-17,21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,10,13-17,21 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 22, 2009 has been entered.

### ***Response to Amendment***

The rejection of claim 17 under 35 USC § 112 is withdrawn by the examiner in view of the amendment filed on October 22, 2009

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 5, 10, 13, 14-17, 21 and 22 are rejected under 35 U.S.C. 102(e) as anticipated by Sanfilippo et al. (US 2005/0177016 A1) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sanfilippo et al. (US 2005/0177016 A1) in view of either Ruottu et al. (US 6,045,688) or Gartside et al. (US 5,254,788).

Sanfilippo discloses a process of producing a vinyl aromatic compound such as styrene by contacting a C<sub>2-5</sub> alkyl-substituted aromatic compound (e.g., ethylbenzene) in a dehydrogenation catalyst in a reaction zone to produce a hydrocarbon product comprising a C<sub>2-5</sub>

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alkenyl-substitute aromatic (e.g., styrene). The spending catalyst is then separated from the hydrocarbon product and passed into regeneration zone and combined with fresh catalyst and returned to the dehydrogenation reaction zone. Styrene is then recovered as a product. The dehydrogenation reaction zone is operated at a temperature of from 400° C to about 750° C, at a pressure of slightly higher atmospheric, at a GHSV higher than 2000 NI/hl<sub>cat</sub> and residence times of the solid (catalyst) of less than 1 minutes. The dehydrogenation comprises an alkaline, manganese, gallium, and platinum deposited on alumina. The feed is introduced to the dehydrogenation reactor at multiple points of entry with an inert carrier gases. (See abstract; Figs. 1-2; paragraphs [0009], [0014], [0015], [0025], [0026]; claims 15 and 18).

Since the process of Sanfilippo is operated at a GHSV higher than 2000 NI/hl<sub>cat</sub> and residence times of the solid (catalyst) of less than 1 minute, it would be expected that the residence times of hydrocarbon and catalyst in the dehydrogenation riser and the separator would encompass the residence times as claimed.

Alternatively,

Ruottu discloses a dehydrogenation reactor wherein the residence time in the dehydrogenation riser reactor is in the range of 0.4 to 0.5 seconds and gas residence time in the separator (e.g., cyclone) is about 1 to 2 seconds. This means that the total contact time of the catalyst in the reaction zone and in the separator would be about 1.4 to 2.5 seconds. Ruottu further teaches that the dehydrogenation riser is operated at a temperature of from 100 to 1300° C (See abstract; col. 3, line 15 through col. 4, line 13; col. 4 lines 45-50; col. 8, lines 7-9).

Gartside teaches a dehydrogenation process wherein the dehydrogenation reaction zone is operated at temperature of from 900 to 1600° F (482 to 871° C) and at a pressure of from 10 to

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about 100 psig. The residence time of the light paraffins in the reaction zone is from about 0.1 to about 2 seconds. Gartside further discloses that the catalyst spends about 0.1 to about 2 seconds from passage through the rectangular orifice to discharge from the separator outlet. This means that the total contact time of the catalyst in the reaction zone and separator is about 0.1 to about 2 seconds. The feed is introduced to the dehydrogenation reactor at multiple points of entry. (See abstract; Figures 2-4; col. 4, lines 5-60; col. 7, lines 24-27; col. 10, lines 42-50; col. 12, lines 35-43; col. 12, line 54 through col. 13, line 3; col. 16, lines 45-56; Tables 2-4)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Sanfilippo by utilizing the dehydrogenation reactor of either Ruottu or Gartside because such reactor has a high efficiency.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAM M. NGUYEN whose telephone number is (571)272-1452. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TN

/Tam M. Nguyen/

Primary Examiner, Art Unit 1797